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L3: Entry 4 of 4 File: DWPI Feb 7, 1995

DERWENT-ACC-NO: 1995-112028
DERWENT-WEEK: 199515

TITLE: Washing appts. for semiconductor wafer using hydrofluoric acid in mfg. process - uses circulation system with pump and filter to circulate processing liq. so that pure water and hydrofluoric acid sent to processing tank are uniformly mixed NoAbstract

PATENT-ASSIGNEE: NIPPON STEEL CORP (YAWA)

PRIORITY-DATA: 1993JP-0200234 (July 20, 1993)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
JP 07037851 A	February 7, 1995		004	H01L021/304

APPLICATION-DATA:

PUB-NO	APPL-DATE	APPL-NO	DESCRIPTOR
JP 07037851A	July 20, 1993	1993JP-0200234	

INT-CL (IPC): H01 L 21/304

CHOSEN-DRAWING: Dwg.1/1

DERWENT-CLASS: U11
EPI-CODES: U11-C06A1B;

WEST Search History

DATE: Thursday, September 04, 2003

Set Name side by side	Query	Hit Count	Set Name result set
DB=USPT,PGPB,JPAB,EPAB,DWPI,TDBD; PLUR=YES; OP=ADJ			
L7	L6 and l3	27	L7
L6	(semiconductor or wafer or substrate) same (clean$3 or treat$3) same ((HF or hydrogen fluoride) with (ozone or 'O.sub.3') with water)	71	L6
L5	L4 and l3	51	L5
L4	(semiconductor or wafer or substrate) same (clean$3 or treat$3) same ((HF or hydrogen fluoride) with (ozone or 'O.sub.3'))	163	L4
L3	((134/3 |134/26 |134/28 |134/34 |134/36 |134/902)!.CCLS. |(216/90 |216/91 |216/108 |216/109)!.CCLS. |(438/906)!.CCLS.)	7766	L3
DB=USPT; PLUR=YES; OP=ADJ			
L2	L1 and ozone	0	L2
L1	6117350.pn. or 6369008.pn. or 6399552.pn.	3	L1

END OF SEARCH HISTORY

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Search Results -

Terms	Documents
L2 same (semiconductor or wafer or substrate)	4

Database: US Patents Full-Text Database; US Pre-Grant Publication Full-Text Database; JPO Abstracts Database; EPO Abstracts Database; Derwent World Patents Index; IBM Technical Disclosure Bulletins

Search: L3

Refine Search

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Search History

DATE: Friday, September 05, 2003 Printable Copy Create Case

Set Name side by side	Query	Hit Count	Set Name result set
	DB=USPT,JPAB,EPAB,DWPI; PLUR=YES; OP=ADJ		
L3	L2 same (semiconductor or wafer or substrate)	4	L3
L2	(clean$3 or etch$3 or wash$3) same ((liquid or solution or mixture) with (uniform$3 or homogen$5) with circulat$5 with pump$3)	31	L2
L1	(clean$3 or etch$3 or wash$3) same ((liquid or solution or mixture) with (uniform$3 or homogen$5) with circulat$5)	214	L1

END OF SEARCH HISTORY

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L7: Entry 2 of 27 File: PGPB Mar 7, 2002

PGPUB-DOCUMENT-NUMBER: 20020026952
PGPUB-FILING-TYPE: new
DOCUMENT-IDENTIFIER: US 20020026952 A1

TITLE: METHOD OF AND DEVICE FOR CLEANING SILICON WAFER, CLEANED SILICON WAFER, AND CLEANED SEMICONDUCTOR ELEMENT

PUBLICATION-DATE: March 7, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
FUJINO, NAOHIKO	TOKYO		JP	
TANAKA, HIROSHI	TOKYO		JP	
KOBAYASHI, JUNJI	TOKYO		JP	
NAKA, JIRO	TOKYO		JP	
ASAOKA, YASUHIRO	TOKYO		JP	
NOMOTO, TAKUYA	TOKYO		JP	

APPL-NO: 09/ 206154 [PALM]
DATE FILED: December 7, 1998

CONTINUED PROSECUTION APPLICATION: This is a publication of a continued prosecution application (CPA) filed under 37 CFR 1.53(d).

FOREIGN-APPL-PRIORITY-DATA:

COUNTRY	APPL-NO	DOC-ID	APPL-DATE
JP	P 09-342656	1997JP-P 09-342656	December 12, 1997
JP	P 10-040141	1998JP-P 10-040141	February 23, 1998
JP	P 10-266263	1998JP-P 10-266263	September 21, 1998

INT-CL: [07] B08 B 3/12, B08 B 7/00, B08 B 7/04, B08 B 3/00

US-CL-PUBLISHED: 134/1.3; 134/1, 134/23, 134/26, 134/28, 134/902
US-CL-CURRENT: 134/1.3; 134/1, 134/23, 134/26, 134/28, 134/902, 257/E21.228

REPRESENTATIVE-FIGURES: 1

ABSTRACT:

A method of and a device for cleaning a silicon wafer, and a method of and a device for cleaning contamination metals and contamination particles adhered on the wafer surface at the same time.

The silicon wafer is cleaned by using a cleaning solution comprising an aqueous solution containing low concentration hydrogen fluoride of 0.0001 to 0.05% by weight and hydrogen peroxide while applying ultrasonic vibration to said cleaning solution. Alternatively, the silicon wafer is cleaned by dipping it in a cleaning solution comprising an aqueous solution prepared by dissolving hydrogen fluoride and ozone.

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L7: Entry 12 of 27 File: USPT Jul 23, 2002

DOCUMENT-IDENTIFIER: US 6423146 B1
TITLE: Method for cleaning a semiconductor substrate

Current US Cross Reference Classification (1):
134/26

Current US Cross Reference Classification (3):
134/902

CLAIMS:

5. The method according to claim 2, further comprises: a third cleaning step of supplying, after the rinsing step, ozone water to the cleaning chamber through an ozone water supply line with an injection device such that the ozone water is applied to the surface of the substrate; a fourth cleaning step of generating, after the oxide film is formed, a second cleaning liquid in which ozone water is supplied through the ozone water supply line and one of hydrogen fluoride and hydrochloric acid is injected into the injection device to mix the ozone water with said one of hydrogen fluoride and hydrochloric acid, and supplying the second cleaning liquid to the cleaning chamber such that the second cleaning liquid is applied to the surface of the substrate, thereby to clean the surface thereof; and a second rinsing step of supplying pure water to the cleaning chamber such that the pure water is applied to the surface of the substrate to rinse the surface thereof, after the second cleaning liquid is supplied to the cleaning chamber for a predetermined time period or a predetermined amount of the second cleaning liquid is supplied thereto.

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L7: Entry 14 of 27 File: USPT Nov 27, 2001

DOCUMENT-IDENTIFIER: US 6323140 B1
TITLE: Method of manufacturing semiconductor wafer

Detailed Description Text (5):
After the final polishing, the surface of a semiconductor wafer is subjected to a high-degree cleaning by a final cleaning process (step 1) using the ozone-containing ultrapure water and DHF (dilute HF) and drying, and then an oxidation treatment is performed by immersing the wafer surface for 5 minutes in an aqueous solution of ozone having the ozone concentration adjusted to about 7 ppm at normal temperature thus forming a protective oxide film of about 0.7 nm in thickness (step 2).

Detailed Description Text (22):
Firstly, a semiconductor wafer subjected to a final polishing is subjected to a final cleaning process (step 21) using an ozone-containing ultrapure water and DHF (dilute HF) to obtain a highly cleaned surface and then dried; immediately thereafter the surface of the semiconductor wafer is subjected to an oxidation treatment for 5 minutes by immersing its surface in an aqueous solution of ozone adjusted to an ozone density of about 7 ppm at the normal temperature thereby forming a protective oxide film of about 0.7 nm in film thickness (confirmed by the analysis of an XPS instrument) (step 22). The semiconductor wafer formed with the protective oxide film is dried in a clean air and then, after it has been stored in a clean atmosphere for a given time or immediately thereafter, the semiconductor wafer is loaded in a CVD epitaxial growth furnace R thereby performing an oxide film removing process in the furnace (step 23).

Current US Cross Reference Classification (4):
438/906

L7: Entry 17 of 27 File: USPT Mar 20, 2001

DOCUMENT-IDENTIFIER: US 6203627 B1
TITLE: Cleaning method

Brief Summary Text (5):
A cleaning method that is widely used during the process of manufacturing semiconductor devices generally involves immersing objects to be processed, such as semiconductor wafers or glass substrates for LCDs (hereinafter called "wafers"), sequentially into a series of cleaning tanks, each filled with a chemical (processing liquid) such as ammonia water (NH.sub.4 OH) or hydrofluoric acid (HF) or a rinse liquid such as distilled water or ozone water, to clean them.

Brief Summary Text (6):
A so-called one-path type of apparatus is known in the art as one form of this cleaning apparatus, wherein a rinse liquid (such as distilled water or ozone water) and a dilute liquid (for example, diluted hydrofluoric acid (DHF) including a rinse liquid and a chemical) such as hydrofluoric acid (HF) are supplied in turn in the same processing tank, and a wafer or the like is immersed within this rinse liquid and diluted liquid for a predetermined time to clean it. With this cleaning apparatus, a dilute liquid (such as DHF) comprising a predetermined quantity of a chemical mixed into a rinse liquid is poured into the processing tank and the wafer or the like is immersed in this dilute liquid (DHF), or the dilute liquid is supplied into the processing tank after the wafer or the like has been accommodated therein, whereby an etching type of "cleaning" can be performed to remove particles adhering to the surfaces of the wafer or to remove metals such as Ni and Fe or natural oxide films that have adhered physically or chemically thereto. The wafer is subsequently immersed in rinse liquid that is supplied to the processing tank, so that any chemical adhering to the wafer surfaces can be removed.

Current US Cross Reference Classification (1):
134/26

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L7: Entry 19 of 27 File: USPT Nov 9, 1999

DOCUMENT-IDENTIFIER: US 5979474 A
TITLE: Cleaning equipment for semiconductor substrates

Detailed Description Text (21):
The present invention is configured as described above, and by controlling a temperature of the treating liquid, an etching ability of HF and an oxidizing ability of ozone are kept constant and the cleaning liquid having a stable action and effect can be obtained. Furthermore, since the mixing ratio of the cleaning liquid by mixing HF and the ozone-dissolved water can be kept constant, the cleaning liquid capable of stably cleaning the wafer surface can be used continuously.

Current US Cross Reference Classification (2):
134/902

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L7: Entry 25 of 27 File: USPT Jun 2, 1998

DOCUMENT-IDENTIFIER: US 5759971 A
TITLE: Semiconductor wafer cleaning liquid

Abstract Text (1):
A semiconductor wafer cleaning liquid includes an aqueous hydrogen fluoride (HF) solution having a HF concentration between 0.03% and 0.05% by weight, which is adjusted to 20.degree. C. or below and into which ozone is directly dissolved up to a saturation point. A method for cleaning semiconductor wafers incudes the steps of charging an aqueous HF solution adjusted to 20.degree. C. or below and having an HF concentration between 0.03% and 0.05% by weight into a treatment bath; dissolving ozone into the aqueous solution up to a saturation point to prepare a cleaning liquid; dipping to etch semiconductor substrate into the cleaning liquid in the treatment bath; and rinsing the semiconductor substrate with pure or ozone-dissolved water in a bath separate from the treatment bath.

Brief Summary Text (15):
Further, this invention relates to a method for cleaning semiconductor wafers comprising charging an aqueous solution adjusted to 20.degree. C. or below and having an HF concentration between 0.03% and 0.05% by weight into a treatment bath and dissolving ozone up to a saturation point into the above aqueous solution to prepare a cleaning liquid, dipping to etch a semiconductor substrate into the cleaning liquid in the treatment bath, and feeding pure water or ozone-dissolved water to rinse the semiconductor substrate. In this case, the substrate is basically rinsed in another bath, but it may be rinsed in the treatment bath, and then in another bath.

Detailed Description Text (9):
As to the particle removing ability, when a wafer is treated with the DHF cleaning in a concentration range effective for removal of metal for 10 minutes, the water has a hydrophobic surface and attracts particles very easily because the natural oxide film is removed. Thus, the treated surface is required to be hydrophilic, so that this embodiment dissolves ozone gas into an aqueous DHF solution to provide the treating liquid with a powerful oxidizing ability. To keep the treated water surface in a hydrophilic condition, the dissolved ozone concentration is required to be 20 ppm or above when the HF concentration is less than 20 ppm, the HF etching ability excels the oxidization rate of ozone, and the treated wafer surface becomes hydrophobic. After treating the wafer in the treatment bath 2, the rinsing in the rinse bath 10 independent from the treatment bath 2 (Ex. 1) can oxidatively decompose organic substances on the wafer surface and also can uniformly stabilize the hydrophilicity of the surface.

Current US Cross Reference Classification (1):
134/3